

Summary:

Does road improvement decrease greenhouse gas emissions?

Road construction does little to combat climate change. A report from the Institute of Transport Economics in Norway (TØI) concludes that, largely speaking, CO₂ emissions increase with more road construction.

In Norway, a debate has been going on over the past couple of years about road improvement as an effective climate policy measure. In a report presented two years ago, it was concluded that greenhouse gas emissions in Norway would go down if the Norwegian road network were improved. This assertion has been reiterated in the political debate in Norway since it was published, while it has also been seriously challenged.

Increased emissions

Commissioned by the Norwegian Public Roads Administration, the Institute of Transport Economics (TØI) has examined this relationship and arrived at a different conclusion. Road construction, largely speaking, increases greenhouse gas emissions, mainly because an improved quality of the road network will increase the speed level, not least in the interval where the marginal effect of speed on emissions is large (above 80 km/h).

Emissions also rise due to increased volumes of traffic (each person travelling farther and more often) and because the modal split changes in favor of the private car, at the expense of public transport and bicycling.

Exceptions

In certain situations, there will be exceptions. One example could be when a road connection is built across a fjord to replace the existing ferry service. This can result in less emission. Building a tunnel that alleviates the need to climb the hill, can be another example – although the tunnel construction in itself might give rise to considerable amounts of emission. But those examples do not change the general conclusion: that road construction increases greenhouse gas emissions.

TØI's analysis of the main question is structured in Table 1, along with the literature and the lessons learned from some of our investigations. It is interesting to observe that all three prototype arenas show increasing emissions due to road-building and that this type of activity is therefore not a successful way of cutting back on emissions.

The main conclusion is that in most situations road construction and the maintenance of new and better roads will, together with direct and indirect consequences of induced traffic, result in increased greenhouse gas emissions. In the larger cities, in particular, increased road capacity will result in significantly increased emissions.

Topics to investigate		Phase 1: Literature studies	Phase 2: Use of the results from literature studies on prototype areas		
			Local measures in greater cities	Local measures in minor cities or towns	Measures intercity
1. Reduced emissions per vehicle km due to better road standard		Uncertain overall effect, i.e. reduction due to less aggressive driving, is challenged by increased emissions due to higher speed	Reduction in short time, stable or some increase in the long run	Depends on the situation, i.e. ranging from no change over moderate increase to strong increase of climate gas emissions	Depends on the situation, i.e. both reduction and growth of emissions per vehicle km can occur
2. Increased use of the car due to better road standard, change in both land-use and modal split	Short term (less than five years)	A 10 percent reduction in travel time gives 3-5 percent growth in traffic	Strong growth in emissions	Moderate increase in emissions	Moderate increase in emissions
	Longer term (more than five years)	A 10 percent reduction in travel time gives 5-10 percent growth in traffic	Strong growth in emissions	Moderate increase in emissions	Moderate increase in emissions
3. Changes in greenhouse gas emissions due to	Road construction/improvement	12 tons CO ₂ equivalents per kilometer of road for dual carriageway roads and 21 tons for four-carriageway roads	The emissions from road building are relatively modest compared to the emissions from traffic	Most of the emissions come from establishing better standard -	Most of the emissions come from establishing better standard -
	Operation and maintenance of the new road network and possibly also of the existing ones	33 tons CO ₂ equivalents per kilometer of road for two-carriageway roads and 52 tons for four-carriageway roads	The emissions from road building are relatively modest compared to the emissions from traffic	- and from operating and maintenance of the network	- and from operating and maintenance of the network